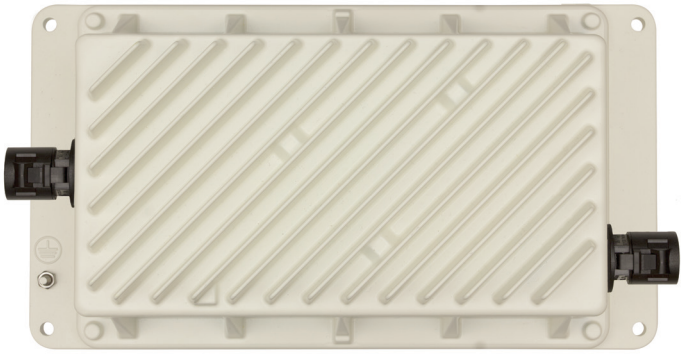
LPR48-300

Installation & Operation Manual

Part # 0120049-J0
Effective: 01/2018



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Your Power Solutions Partner

LPR48-300

NOTE:

Photographs contained in this manual are for illustrative purposes only. These photographs may not match your installation.

NOTE:

Operator is cautioned to review the drawings and illustrations contained in this manual before proceeding. If there are questions regarding the safe operation of this powering system, contact Alpha Technologies or your nearest Alpha representative.

NOTE:

Alpha shall not be held liable for any damage or injury involving its enclosures, power supplies, generators, batteries, or other hardware if used or operated in any manner or subject to any condition inconsistent with its intended purpose, or if installed or operated in an unapproved manner, or improperly maintained.

For technical support, contact Alpha Technologies:

Canada and USA: **1-888-462-7487**
International: **+1-604-436-5547**

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Table of Contents

1. Safety

SAVE THESE INSTRUCTIONS: This manual contains important safety instructions that must be followed during the installation, servicing, and maintenance of the product. Keep it in a safe place. Review the drawings and illustrations contained in this manual before proceeding. If there are any questions regarding the safe installation or operation of this product, contact Alpha Technologies or the nearest Alpha representative. Save this document for future reference.

1.1 Safety Symbols

To reduce the risk of injury or death, and to ensure the continued safe operation of this product, the following symbols have been placed throughout this manual. Where these symbols appear, use extra care and attention.

The use of ATTENTION indicates specific regulatory/code requirements that may affect the placement of equipment and /or installation procedures.

NOTE:

A NOTE provides additional information to help complete a specific task or procedure. Notes are designated with a check mark, the word NOTE, and a rule beneath which the information appears.

CAUTION!

CAUTION indicates safety information intended to PREVENT DAMAGE to material or equipment. Cautions are designated with a yellow warning triangle, the word CAUTION, and a rule beneath which the information appears.

WARNING!

WARNING presents safety information to PREVENT INJURY OR DEATH to personnel. Warnings are indicated by a shock hazard icon, the word WARNING, and a rule beneath which the information appears.

HOT!

The use of HOT presents safety information to PREVENT BURNS to the technician or user.

1.2 General Safety

WARNING!

This system is designed to be installed in a restricted access location that is inaccessible to the general public.

1.3 Mechanical Safety

- Power supplies can reach extreme temperatures under load.
- Use caution around sheet metal components and sharp edges.

1.4 Electrical Safety

WARNING!

Hazardous voltages are present at the input of power systems. The DC output from rectifiers and batteries, though not dangerous in voltage, has a high short-circuit current capacity that may cause severe burns and electrical arcing.

Before working with any live battery or power system, follow these precautions:

a. Remove all metallic jewelry, such as watches, rings, metal rimmed glasses, or necklaces.

b. Wear safety glasses with side shields at all times during the installation.

c. Use OSHA approved insulated hand tools.

WARNING!

Lethal voltages are present within the power system. Always assume that an electrical connection or conductor is energized. Check the circuit with a voltmeter with respect to the grounded portion of the enclosure (both AC and DC) before performing any installation or removal procedure.

- Do not work alone under hazardous conditions.
- A licensed electrician is required to install permanently wired equipment. Hazardous voltages are present at the input of power systems. Ensure that the utility power is disconnected and locked out before performing any installation or removal procedure.
- Ensure that no liquids or wet clothes come into contact with internal components.
- Hazardous electrically live parts inside this unit are energized from the batteries even when the AC input power is disconnected.

2. Product Overview

2.1 Scope of the Manual

This instruction manual explains the installation and interconnection of Alpha Technologies' LPR48-300 down converter system. To aid with installation, frequent reference is made to the drawings located at the rear of the manual.

2.2 Introduction

The LPR48-300 is a compact, sealed, standalone, RFT-V line powering down-converter unit designed for remote line powering applications using +/- 190Vdc (RFT-V circuit) over twisted copper pairs. The LPR48-300 provides two regulated nominal -48Vdc outputs from four twisted copper pair inputs, with maximum power of 300W.

Line Powering Network (a.k.a. Express, Simplex, Remote, Centralized) is a method of distributing energy over the copper network. Multiple twisted-pair copper is used to distribute 100VA limited power source at ±190Vdc. The individual, isolated inputs are terminated at a remote end and converted back to a -48Vdc supply.

Power holdup capabilities are incorporated into the LPR48-300 to provide at least 100 millisecond of backup for a 300W load. The holdup prevents potential lengthy customer communication outages due to remote node resetting caused by line surges and ensure maximum reliability.

See the Features section for more information. The Specifications Section of this manual, details the electrical ratings.

2.3 Part Number

This product is available to order under the following part numbers:

LPR48-300 and LPR Cables 0370445-001

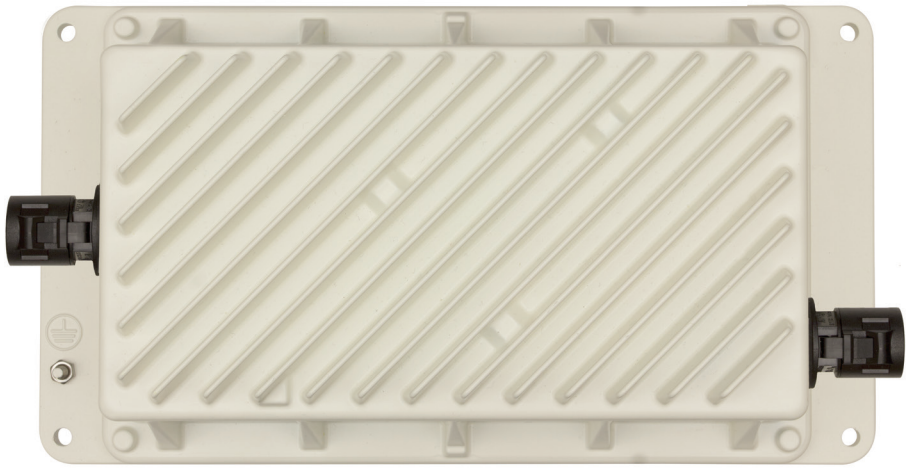


Figure 1 — Front view of the LPR48-300

2.4 Product Features

Output Power

Each of the four isolated converters on each LPR48-300 module has a maximum output capacity of 75W (for a total capacity of 300W per module). The power output is a function of the input voltage into each converter. Proper network engineering and copper pair sizing is a requirement for meeting the power demand of the load.

Current Limit

The current limiting function provides a primary response to output overload situations.

Input Low Voltage Protection

The converter module is electronically protected from low voltages at the inputs by fault detection circuitry. If the input to the converter module falls below the lower DC input limit (see Specifications), the module will shut down.

Reverse Polarity Protection

The converter design has incorporated reverse polarity protection from the connection to a power source on the input. This prevents damage to the converter circuitry if a reverse connection is made.

3. Product Specifications

Electrical	
Input voltage:	200 to 380Vdc (+/- 100 to +/- 190Vdc)
Number of Inputs:	4
Input Current per feed:	245mA max
Output voltage:	53.0 to 55Vdc
Power:	Up to 300W (the power available from the unit depends on the distance from the up-converter and wire gauge of the twisted copper pairs)
Output Current:	5.48A at full rated load of 300W (de-rates with input voltage)
Efficiency:	>92% at nominal output
Regulation:	<2% no load to full load <1% line
Electrical Noise:	100mVRMS to 20MHz (wide band) <500mVp-p to 20MHz
Hold up Time:	>100 millisecond at 300W load
Mechanical	
Dimensions (HxWxD):	Millimeters: 70H x 255W x 140D Inches:2.8H x 10.0W x 5.5D
Weight:	2.3 kg (5 lb), without cabling
Connections:	Requires LPR cable kit with pre-connectorized input and output cable
Environmental	
Temperature Operating:	-40 to 65˚C (-40 to 149˚F)
Temperature Storage:	-40 to 85˚C (-40 to 185˚F)
Environmental Protection:	IP67
Humidity	5 to 100% RH non-condensing
Altitude:	-500 to 2000 m (-1640 to 6562 ft)
Agency Compliance	
Safety:	IEC/CSA/UL 60950-1 IEC/CSA/UL 60950-21 (RFT-V circuit) IEC/CSA/UL 60950-22 ATIS-0600030.2016 ITU-T K.50 Low Voltage Directive 2006/95/EC Telcordia GR-1089-CORE A2 Voltage Class
EMC:	FCC CFR47 Part 15 Class A EN 300 386 v1.6.1 EMC Directive 2014/30/EC

4. Inspection

4.1 Pre-installation Requirements

4.1.1 Effective Capacitance

At the time of installation, carry out a system assessment to ensure that the effective capacitance of the total system, including the capacitance from the output of the up-converter (front-end), does not exceed 11 µF (Line to Earth) and 40µF (Line to Line).

4.1.2 RFT-V Circuits

At the time of installation, ensure that the voltage rating of the wiring of the telecommunication network is adequate for the normal RFT circuit voltage (+/-200Vdc), together with superimposed transients.

Ensure that the circuits to be connected together are all RFT-V circuits.

4.1.3 Primary Protection

The LPR Series has built-in surge protection across the input terminals in compliance with the GR-1089-CORE requirement. External primary protection is recommended for outdoor aerial installation.

4.1.4 Installation Locations

Allowable installation locations for the LPR converters include the following: outdoors, direct sunlight, and inside or outside a cabinet.

4.2 Packing Materials

Alpha is committed to providing products and services that meet our customers' needs and expectations in a sustainable manner, while complying with all relevant regulatory requirements. As such Alpha strives to follow our quality and environmental objectives from product supply and development through to the packaging for our products.

Rectifiers and batteries are shipped on individual pallets and are packaged according to the manufacturer's guidelines.

Almost all of Alpha's packaging material is from sustainable resources and or is recyclable.

4.3 Returns for Service

Save the original shipping container. If the product needs to be returned for service, it should be packaged in its original shipping container. If the original container is unavailable, make sure that the product is packed with at least three inches of shock-absorbing material to prevent shipping damage.

Alpha Technologies is not responsible for damage caused by improper packaging of returned products.

4.4 Check for Damage

Before unpacking the product, note any damage to the shipping container. Unpack the product and inspect the exterior for damage. If any damage is observed, contact the carrier immediately.

Continue the inspection for any internal damage. In the unlikely event of internal damage, inform the carrier and contact Alpha Technologies for advice on the impact of any damage.

4.5 General Receipt of Shipment

The inventory included with your shipment depends on the options you have ordered. The options are clearly marked on the shipping container labels and bill of materials.

Call Alpha Technologies if you have any questions before you proceed: 1-888-462-7487.

5. Installation

This chapter is provided for qualified personnel to install the product, which shall be mounted in the most non extreme environment. The installer should follow all applicable local rules and regulations for electrical and battery installations; e.g., CSA, UL, CEC, NEC, OSHA, and local fire codes.

5.1 Safety Precautions

WARNING!

This system is designed to be installed in a restricted access location that is inaccessible to the general public.

Refer to the Safety section near the front of this manual.

5.2 Tools Required

Various insulated tools are essential for the installation.

Use this list as a guide:

- Electric drill with hammer action, 1/2" capacity.
- Various crimping tools and dies to match lugs used in installation.
- Digital voltmeter equipped with test leads.
- Cutters and wire strippers (#14 to #22 AWG) [2.5 to 0.34 mm^2].

5.3 Module Preparation/Mounting

For detailed information refer to 0120049-08 drawing at the rear of this manual.

Recommended hardware:

- 4x #10 screws or bolts
- 4x #10 flat narrow washers with 0.75" OD max.

The LPR48-300 can be mounted to surfaces with #10 (M5) fastening hardware in four locations. Alpha recommends using flat washers for improved fastening.

6. Wiring Connections

WARNING!

For safety reasons, ensure the unit is properly bonded to the enclosure's ground grid.

Input voltage shall meet UL60950-21 RFT-V requirements. DO NOT CONNECT TO RFT-C CIRCUITS.

Chassis must be permanently grounded.

-48V return (RTN) shall be earthed.

Telecom cable carrying ±190V, shall be #26AWG minimum (rated 200V minimum).

Primary over voltage protection must be provided on all input pairs.

Insulation of the outside plant conductors should be rated >90°C (194°F).

Insulation of the wiring inside the enclosed equipment cabinets should be rated 105°C (221°F) minimum. Cables must be dressed to avoid damage to the conductors.

CAUTION!

This equipment is intended to be used in outdoor environments.

Load connections should be made in close proximity to the power output.

6.1 DC Input and Output Connectors

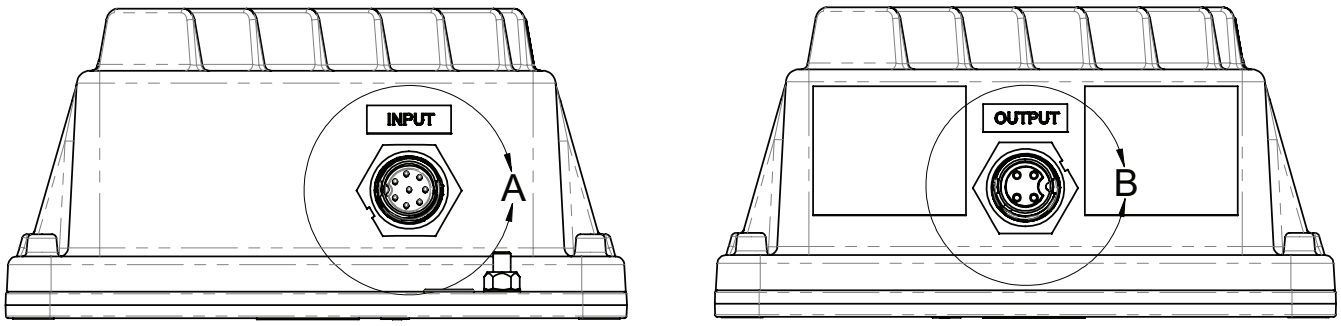


Figure 2 — Output and input connector view

6.2 LPR Cable Kit

An LPR cable kit is included with the LPR48-300 consists a set of two, 2.4 m (8 ft) long cables each with one cut cable end, and one end pre-terminated with an LPR mating connector. The kit contains:

- Input cable
- Output cable

6.2.1 DC Input

DC Input use: 8x #24AWG. Use the 8 pin conductor cable (8701067-001) for DC input connections.

Wiring Table			
Input	**PIN Number**	**Wire Color**	**Circuit Designation**
Input 1	1	White / Blue	+190V_ChA
	2	Blue	-190V_ChA
Input 2	3	White / Orange	+190V_ChB
	4	Orange	-190V_ChB
Input 3	5	White / Green	+190V_ChC
	6	Green	-190V_ChC
Input 4	7	White / Brown	+190V_ChD
	8	Brown	-190V_ChD

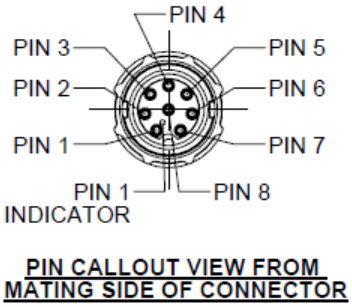


Figure 3 — 8 PIN Cable Connector

6.2.2 DC Output

DC Output use: 4x #20AWG. Use the four conductor cable (8701066-001) for DC output connections.

Wiring Table			
Output	**PIN Number**	**Wire Color**	**Circuit Designation**
Output 1	1	Black	Vout1-RTN
	2	White	+Vout1
Output 2	3	Green	Vout2-RTN
	4	Red	+Vout2

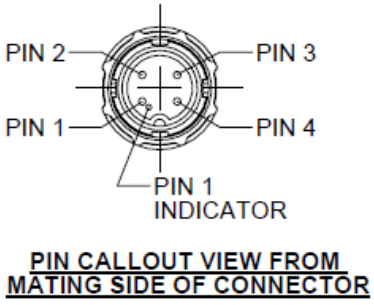


Figure 4 — 4 PIN Cable Connector

7. Initial Start Up

1. Remove customer-supplied 5-pin protectors (if available) from power-pairs termination block and disconnect the output –48V cable.
2. Verify by both measurement and observation that the chassis of the system is bonded to ground.
3. Connect module input cable to the host system
4. Complete the input circuits by plugging in the 5-pin protectors.
5. Measure the output voltage to be <56Vdc for LPR48-300 and reconnect the output cable.

7.1 Normal Mode of Operation

Normal operation of the converter system will be indicated by the presence of voltage on the converter output cables.

7.2 Reverse Polarity Protection

The converter will not be damaged and will operate if an input connection is made in reverse.

8. Warranty and Service Information

8.1 Technical Support

In Canada and the USA, call toll free 1-888-462-7487

Customers outside Canada and the USA, call +1-604-436-5547.

8.2 Warranty

Alpha warrants that for a period of two (2) years from the date of shipment its products shall be free from defects under normal authorized use consistent with the product specifications and Alpha's instructions, unless otherwise specified in the product manual, in which case, the terms of the manual will take precedence

The warranty provides for repairing, replacing or issuing credit (at Alpha's discretion) for any equipment manufactured by it and returned by the customer to the factory or other authorized location during the warranty period.

There are limitations to this warranty coverage. The warranty does not provide to the customer or other parties any remedies other than the above. It does not provide coverage for any loss of profits, loss of use, costs for removal or installation of defective equipment, damages or consequential damages based upon equipment failure during or after the warranty period. No other obligations are expressed or implied. Warranty also does not cover damage or equipment failure due to cause(s) external to the unit including, but not limited to, environmental conditions, water damage, power surges or any other external influence.

The customer is responsible for all shipping and handling charges. Where products are covered under warranty Alpha will pay the cost of shipping the repaired or replacement unit back to the customer.

8.3 Return of Material

Please contact Technical Support at the number above to obtain a Service Repair Order (or Return Material Authorization) number BEFORE sending material back. This will ensure that your service needs are handled promptly and efficiently.

8.4 Service Centers

For a list of service centers, refer to the Alpha website: www.alpha.ca.

9. Acronyms and Definitions

AC	Alternating current
AWG	American wire gauge
CEC	Canadian Electrical Code
CMA	Circular mil area
CSA	Canadian Standards Association
DC	Direct current
LED	Light emitting diode
LPR	Line Powering Remote
NC	Normally closed
NEC	National Electrical Code (for the USA)
NO	Normally open
OSHA	Occupational Safety & Health Administration
OVP	Over voltage protection
RU	Rack unit (1.75”)
UL	Underwriters Laboratories

10. Certification

About CSA and NRTL

CSA (Canadian Standards Association also known as CSA International) was established in 1919 as an independent testing laboratory in Canada. CSA received its recognition as an NRTL (Nationally Recognized Testing Laboratory) in 1992 from OSHA (Occupational Safety and Health Administration) in the United States of America (Docket No. NRTL-2-92). This was expanded and renewed in 1997, 1999, and 2001. The specific notifications were posted on OSHA's official website as follows:

- Federal Register #: 59:40602 - 40609 [08/09/1994]
- Federal Register #: 64:60240 - 60241 [11/04/1999]
- Federal Register #: 66:35271 - 35278 [07/03/2001]

When these marks appear with the indicator "C and US" or "NRTL/C" it means that the product is certified for both the US and Canadian markets, to the applicable US and Canadian standards. (1)

Alpha rectifier and power system products, bearing the aforementioned CSA marks, are certified to CSA C22.2 No. 60950-01 and UL 60950-01. Alpha UPS products, bearing the aforementioned CSA marks, are certified to CSA C22.2 No. 107.3 and UL 1778.

As part of the reciprocal, US/Canada agreement regarding testing laboratories, the Standards Council of Canada (Canada's national accreditation body) granted Underwriters Laboratories (UL) authority to certify products for sale in Canada. (2)

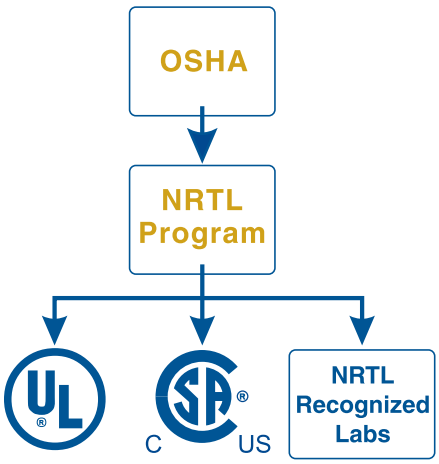
Only Underwriters Laboratories may grant a licence for the use of this mark, which indicates compliance with both Canadian and US requirements. (3)

NRTLs capabilities

NRTLs are third party organizations recognized by OSHA, US Department of Labor, under the NRTL program.

The testing and certifications are based on product safety standards developed by US based standards developing organizations and are often issued by the American National Standards Institute (ANSI). (4)

The NRTL determines that a product meets the requirements of an appropriate consensus-based product safety standard either by successfully testing the product itself, or by verifying that a contract laboratory has done so, and the NRTL certifies that the product meets the requirements of the product safety standard. (4)



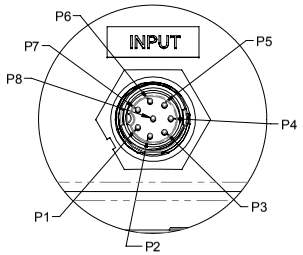
Governance of NRTL

The NRTL Program is both national and international in scope with foreign labs permitted.

(1)www.csagroup.org
(2) www.scc.ca
(3) www.ulc.ca
(4) www.osha.gov

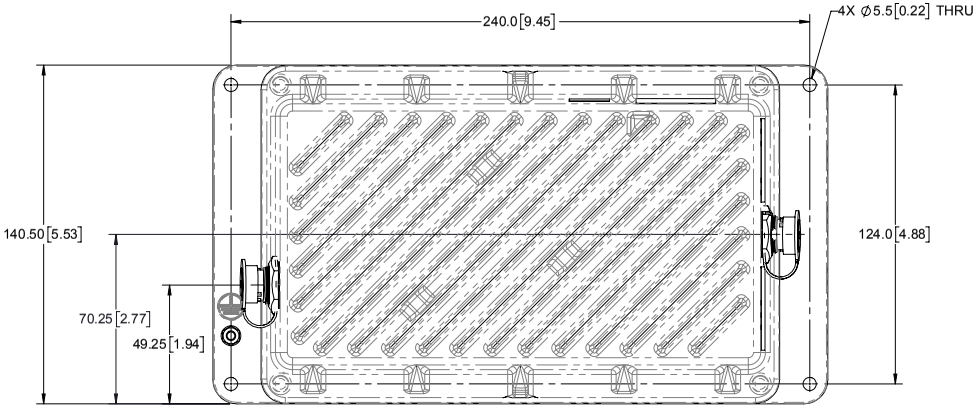
DO NOT SCALE DRAWING

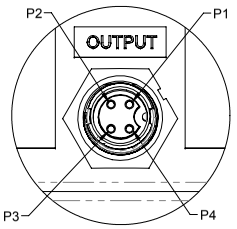
REVISIONS				
LTR	DESCRIPTION	DWN	DATE	CHK
B	OUTPUT CONNECTOR MOVED TO CENTER, DIM WAS 49.25	ZL	28-Nov-17	GL



DETAIL A
SCALE: 1 : 1

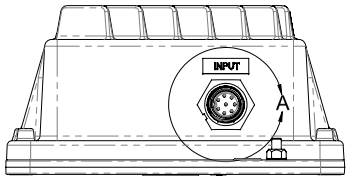
	PIN #	CIRCUIT DESIGNATION
INPUT 1	1	+190V_ChA
	2	-190V_ChA
INPUT 2	3	+190V_ChB
	4	-190V_ChB
INPUT 3	5	+190V_ChC
	6	-190V_ChC
INPUT 4	7	+190V_ChD
	8	-190V_ChD

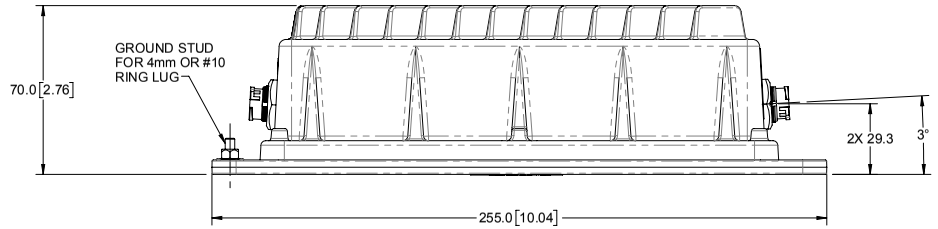


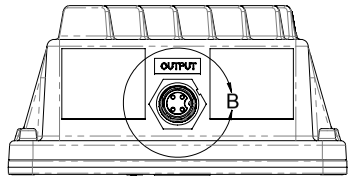


DETAIL B
SCALE: 1 : 1

	PIN #	CIRCUIT DESIGNATION
OUTPUT 1	2	+VOUT1
	1	VO-RTN1
OUTPUT 2	4	+VOUT2
	3	VO-RTN2







CONNECTOR CAPS REMOVED
FOR CLARITY

UNLESS OTHERWISE SPECIFIED
DIM ARE IN MM
X 1
X.X 0.5
X.XX 0.25
ANGULAR: ±1°
INTERPRET DIM AND TOL PER ASME Y14.5M-1994
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	ZL	Sep-25-17
CHECKED	G LUMANOG	Oct-16-17

TITLE: OUTLINE/CONNECTION DRAWING, LPR48-300

SIZE	DWG NO.	REV
B	0120049-08	B

SCALE: 1:2 SHEET 1 OF 1

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